

**NOAA/National Weather Service  
Product Description Document**

**Experimental Maximum Wave Height in Great Lakes Open Lake Forecast (GLF)  
and Nearshore Forecasts (NSH)**

**January 13 2017**

**Part I. Mission Connection**

- a. Product Description** – The Great Lakes (GL) Weather Forecast Offices (WFOs) routinely issue the Open Lake Forecast (GLF) and Nearshore Forecast (NSH). These text products state expected weather conditions within their marine forecast areas of responsibilities for the next five days.

All the GL WFOs in Eastern Region and Central Region are testing an experimental enhancement to their GLF and NSH, adding the maximum wave height (expressed as occasional wave height) which is the average of the highest one-tenth of all waves whenever wave heights of six feet or higher are forecast. Inclusion of “occasional waves” in addition to “significant waves” allows National Weather Service (NWS) to be more explicit and scientifically correct in what is being forecast. Allowing “occasional waves” should reduce the temptation to inflate “significant wave” forecasts toward the higher end of the wave spectrum.

For more information regarding the GLF and NSH products, refer to NWSI 10-312.

- b. Purpose** - The purpose of this is to enhance the GL WFOs’ GLF and NSH with the inclusion of the maximum wave height (expressed as occasional wave height) which is the average of the highest one-tenth waves.

In general, it is assumed that individual wave heights can be described using this distribution, which accounts for these wave heights:

- ( $H_f$ ) Most Frequent
- ( $H_{ave}$ ) Average
- ( $H_s$ ) Significant (currently forecast in the GLF)
- ( $H_{1/10}$ ) Highest one-tenth (occasional wave height)

- c. Audience** – The target audience is the marine community in general.
- d. Presentation Format** – The highest one-tenth (or maximum) wave height will be expressed as occasional wave height in GL WFOs’ GLF and NSH whenever wave heights of six feet or higher are forecast. This additional information will be made available through NOAA Weather Radio (NWR) broadcast and through the web.

- e. **Feedback Method** – Feedback regarding this enhancement the GLF and NSH at all GL WFOs can be provided through the following survey link:

[www.nws.noaa.gov/survey/nws-survey.php?code=EMWHGLF](http://www.nws.noaa.gov/survey/nws-survey.php?code=EMWHGLF)

During this experimental period, a proactive effort is being made to educate users and partners about product availability and use. At the end of the comment period, a decision will be made whether to transition to operational, extend the comment period, or to discontinue the enhancement.

## **Part II. Technical Description**

- a. **Format and Science Basis** – Wave Heights in the GL are modeled according to a wave spectrum. In general, it is assumed that individual wave heights can be described using this distribution, which accounts for these wave heights:

(H<sub>f</sub>) Most Frequent

(H<sub>ave</sub>) Average

(H<sub>s</sub>) Significant (currently forecast in the GLF)

(H<sub>1/10</sub>) Highest one-tenth of all waves (occasional wave height)

As described above, this distribution accounts for an average value, with most elements or individual wave heights clustered toward the lower values, and only a few exceptionally large values.

Several different wave statistics can be inferred from this distribution. For example, the most frequent wave height (H<sub>f</sub>), which is approximately half the value of the significant wave height, and the average wave height (H<sub>ave</sub>), which is estimated to be about 5/8 the value of the significant wave height.

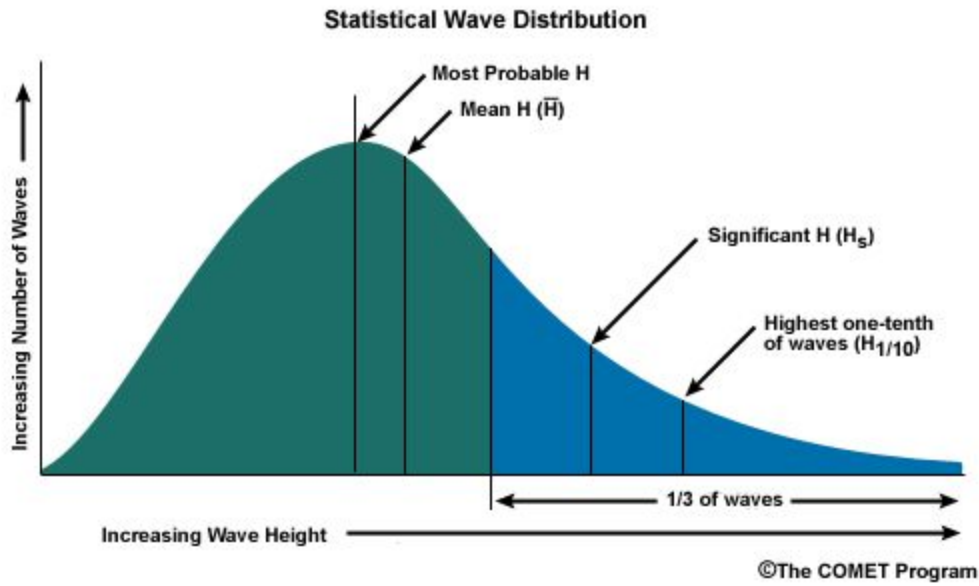


Figure 1

As shown in Figure 1, the average wave height of the highest 10% of waves observed is approximately **1.26** times the significant wave height. The inclusion of  $H_{1/10}$  wave height into the GLF and NSH provides a more descriptive and accurate assessment of the wave field expected for any particular time across a given marine zone.

Logistically, this addition could further improve the value of decisions made within the marine community. More important, knowledge of this information could reduce the number of marine incidents and accidents out at sea, saving lives.

- b. Product Availability** - These additions are made as part of the routine forecast provided online at the following WFOs:

WFO Chicago (LOT): <http://www.weather.gov/lot/marine>  
 WFO Detroit (DTX): <http://www.weather.gov/greatlakes/#.WHjuIH2kzRM>  
 WFO Duluth (DLH): <http://www.weather.gov/dlh/marine>  
 WFO Marquette (MQT): <http://www.weather.gov/greatlakes/#.WHjvsn2kzRM>  
 WFO Gaylord (APX): <http://www.weather.gov/greatlakes/#.WHjwJH2kzRM>  
 WFO Milwaukee (MKX): <http://www.weather.gov/mkx/local-marine>  
 WFO Green Bay (GRB): <http://www.weather.gov/grb/marine>  
 WFO Northern Indiana (IWX): <http://www.weather.gov/greatlakes/#.WHjyEH2kzRM>  
 WFO Grand Rapids (GRR): <http://www.weather.gov/greatlakes/#.WHjyUX2kzRM>  
 WFO Cleveland (CLE): <http://www.weather.gov/cle/Marine>  
 WFO Buffalo (BUF): <http://www.weather.gov/greatlakes/#.WHjzBn2kzRM>

- c. Additional Information** – A Graphical Forecast Editor procedure will automatically create the different statistical gridded wave height information described above from the official

National Digital Forecast Database Wave Height forecast. The GLF and NSH text formatter also includes the additional wave spectra information. No special software will be necessary to generate these additions.